Geophysical Research Abstracts
Vol. 14, EGU2012-3582, 2012
EGU General Assembly 2012

Prograde fluid in Tso Morari UHP rocks, Ladakh India

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The implications of combined petrological and fluid inclusion studies in understanding the tectonics of the UHP terrains in the Himalaya is that, the fluid recycling can occur in the pre-UHP and the post-eclogitic stages. The identified UHP eclogites of the Tso Morari Unit in the NW Himalaya show the primary generated fluids were derived from mineral dehydration during prograde transition of blueschist to eclogite facies. This transition process offset the fluid migration from downgoing slab as a consequence of elevated temperature. The brine within the peak mineral (qtz within grt and omp) signify that the fluids might be derived from downgoing metasedimentary or mafic rocks. The post peak metamorphic fluids began with the formation of the immiscible CO_2 possibly governed by an extensive consumption of carbonates. This led to the production of the C-bearing phases, which significantly generated immiscible CH4. The same explanation may hold for the generation of the immiscible N2, due to breakdown of ammonium bearing K-minerals. This reaction may produce immiscible fluids that are separated effectively and later entrapped within the same metamorphic rock. So far a direct textural evidence of heterogeneous trapping of two immiscible fluid pairs are rare, but often shows two conjugate fluids were trapped in the variable amount in the same inclusion. On the other hand, near peak P-T high salinity brines accompanying high-density carbonic fluid inclusions are obvious and quite often generated through K-bearing minerals of granulite facies rocks. Furthermore, noticeable salinity difference during the last phase of metamorphic reaction series could be modified from the surrounding rocks. During exhumation, the productions of hydrous phases are mostly due to clinopyroxene break down to amphiboles. Hence, the produced fluids during retrogression are usually rich in water. Water usually contains adequate quantity of dissolved components- more significantly NaCl, KCl etc. Of course, salinity and temperature may be used as compositional discriminator. However, salinity of composition ($< \sim 6$ wt% NaCl) change dramatically if the CO_2 were considered. The CO_2 rich fluid, appeared to be a major component, could be trapped soon after the Indian slab initiated exhumation. In summary, this work elucidates the complexity of fluid behaviour in high-grade rocks. The systematic observation of fluid inclusions hosted by quartz included in garnet and few within jadeites, retained few rather not absent, primary fluid inclusions. It is noticed that the primary fluid bearing minerals easily escaped deformations as well as post trapping changes.